"VERSION WITH MARKINGS TO SHOW CHANGES MADE"

IN THE ABSTRACT:

The abstract of the disclosure has been amended as follows:

[A moving body is linearly moved by a rotary type supersonic motor and an output transmission means such as a cam and a pinion rotating in cooperation with a rotor of the supersonic motor, and a pressurizing mechanism for imparting a contact pressure is provided between the moving body and the output transmission member to realize a linear motion mechanism with a supersonic motor. Thus, it is possible to perform a fine feed and a rough feed with high precision without any backlash and it is possible to form a linear motion mechanism with a high rigidity which is hardly affected by an external vibration or the like.

Also, since a compact and high power supersonic motor is used, it is possible to miniaturize and thin the overall equipment, and to form a linear motion mechanism that is not affected by magnetic effect and does not affect the others. Also, the power is not consumed during the mechanism is not in operation.

Accordingly, it is possible to realize a compact linear motion mechanism with a supersonic motor that may

perform the high precision positioning in a low power consumption, and electronic equipment using the same.]

A linear motion mechanism comprises a supersonic motor having a shaft, a vibrating body supported by the shaft, a piezoelectric element having an electrode pattern and being driven by a voltage signal to undergo expansion and compression movement to vibrationally drive the vibrating body, and a rotor disposed on the vibrating body for undergoing rotation about a longitudinal axis of the shaft in accordance with vibration of the vibrating body. A transmission mechanism is connected to the rotor for rotation therewith. A moving body undergoes linear movement in a direction crosswise to the longitudinal axis of the shaft in accordance with rotation of the transmission mechanism. A pressurizing mechanism presses the moving body into pressure contact with the transmission mechanism.

IN THE SPECIFICATION:

Heading beginning at line 4 of page 9 has been amended as follows:

BRIEF [DESICRIPTION] DESCRIPTION OF THE DRAWINGS

Paragraph beginning at line 11 of page 9 has been amended as follows:

Figs. [3] 3A-3E show a drive principle of the supersonic motor according to the present invention;

Paragraph beginning at line 22 of page 9 has been amended as follows:

Figs. [7] 7A-7E show a second example of a linear motion mechanism using a supersonic motor according to the present invention;

Paragraph beginning at line 24 of page 9 has been amended as follows:

Figs. [8] 8A-8E show a modification example 1 of the second example of the linear motion mechanism using the supersonic motor according to the present invention;

Paragraph beginning at line 2 of page 10 has been amended as follows:

Figs. [9] 9A-9B show a modification example 2 of the second example of the linear motion mechanism using the supersonic motor according to the present invention;

Paragraph beginning at line 15 of page 11 has been amended as follows:

Figs. 1-2 show a structure of a supersonic motor 1 to which the present invention may be applied, and Figs. [3] 3A-3E show an operational principle of the supersonic motor 1. The operational theory of the supersonic motor according to the present invention will first be described. In Fig. 2, a disc-like vibrating body 3 is supported to a center shaft 6 fixed at its center to a support plate 5. A piezoelectric element 2 is bonded to a first surface of the vibrating body 3, and projections 3a for enlarging a vibratory shift of the vibrating body 3 and imparting a rotational force to a rotor 4 are provided on a second surface. A bearing 7 is provided at the center of the rotor 4 and the center thereof is guided by the center shaft 6. A pivot 8 provided on a central portion of the rotor and having a tip end curved is pressurized by a spring member 9 having one end fixed to a spring seat 10 to thereby impart a contact pressure between the projections 3a of the vibrating body 3 and the rotor 4. A vibrating wave excited to the vibrating body 3 is converted into the rotational force of the rotor 4 through the frictional force by the piezoelectric effect of the piezoelectric element 2.

Paragraph beginning at line 25 of page 21 has been amended as follows:

A third embodiment of the present invention will now be described. Fig. 10 is a top plan view of a pivotal or swing motion mechanism using a supersonic motor 1 and its application.

Paragraph beginning at line 2 of page 22 has been amended as follows:

The moving body 37 is supported rotatably in a direction indicated by the arrow 39 about a point 40a. There is no limit as to how [to support.] the moving body may be supported. A bearing and a center shaft having the center located at the point 40a [are] can be used on the bottom surface of the moving body 37, for example.

Paragraph beginning at line 20 of page 22 has been amended as follows:

For instance, if a filter 38 made of dielectric multi-layered film is provided on a top surface of the moving body 37, and an optical fiber [39] 39a is provided at a confronting position with the filter 38, the transmission center wavelength of a ray of light introduced from the optical fiber 39a and passing through the filter 38 changes in

accordance with an angle of the filter 38 and is introduced into the optical fiber 39b. Accordingly, it is possible to realize an optical filter that is thus superior in variable resolving power.

Paragraph beginning at line 17 of page 23 has been amended as follows:

A rotary body 45 has a slant portion that has at least one different thickness in the circumferential direction of the rotor 4 and is fixed so as to be rotated together with the rotor 4. A linearly moving body portion 46 having a projecting portion at least a part of which is in contact with the slant portion of the rotary body 45 [guides] <u>is guided by</u> guide members 47a and 47b in accordance with the rotational motion of the rotor so that the linearly moving body portion 46 is moved linearly in the thickness direction of the rotor. The linearly moving body portion 46 has, at a part thereof, a moving body 44 that is to be driven. Here, the pressurizing spring 15 that is a second pressurizing mechanism is provided so that the linearly moving body portion 46 of the moving body 44 is pressed and contacted at a suitable pressure to the rotary body portion 45 so that the minute rattle amount may be compensated for to thereby realize a linear motion mechanism with a supersonic motor with high precision. Incidentally,

since the pressurizing pressure in the pressurizing spring 15 that is the second pressurizing mechanism is set to be smaller than the pressurizing force of [the] a pressurizing spring that is the first pressurizing mechanism a so that the drive force of the supersonic motor is not affected by an adverse effect due to [the] an external turbulence such as a load of [the] a moving member 100, body 44, it is possible to realize [the] a linear motion mechanism with [the] a supersonic motor that is stable even in small size and thin shape to obtain the drive force.

Paragraph beginning at line 15 of page 24 has been amended as follows:

Fig. 13 is a block diagram showing a modification example 1 of the third example of the linear motion mechanism using the supersonic motor. The basic structure thereof is not different from that shown in Fig. 11. However, it is noted that the amount of movement of the moving [body 44] member 100, corresponding to the moving body 4 in Fig. 11, is detected by means of a moving body detecting means 105 and a signal thereof is fed to the control circuit 101 and the position is drivingly compensated for with the supersonic motor drive circuit 104.

Paragraph beginning at line 26 of page 24 has been amended as follows:

Fig. 14 is a diagram showing a modification example 2 of the third example of the linear motion mechanism using the supersonic motor. The basic structure thereof is not different from that shown in Fig. 11. However, a connector 51 in which a fiber 49 and a lens 50 are arranged centrally is provided on the fixing and supporting member 42 and in the same manner a connector 54 in which a fiber 52 and a lens 53 is arranged centrally is provided on the moving body 44 and the moving body 44 is linearly moved by the rotation of the supersonic motor so that an optical intensity is variable when the intensity of light emitted from the fiber [51] <u>49</u> is received in the fiber 52. With such an arrangement, for instance, it is possible to realize an attenuator that is an optical information communication module which is free from the effect of [the] magnetic noise and strong against [the] <u>an</u> external turbulence such as [vibration] <u>vibrations, and which is small</u> in [small] size and <u>has</u> [in] low power consumption.

Paragraph beginning at line 15 of page 25 has been amended as follows:

Fig. 15 is a diagram showing a modification example 3 of the third example of the linear motion mechanism using

the supersonic motor. The basic structure thereof is not different from that shown in Fig. 11. However, a lens 55 is mounted on the fixing and supporting member 42 and in the same manner a lens 56 is mounted on the movable body 44. The moving body 44 is moved linearly by the rotation of the supersonic motor to thereby change an optical distance. With such an arrangement, for example, it is possible to realize a focus setting mechanism, an auto-focus mechanism, an iris mechanism for a camera, a video camera, an optical pickup or the like that are free from the adverse affect of [the] magnetic noise and are strong against [the] <u>an</u> external turbulence such as [vibration in] <u>vibrations, and which is</u> small <u>in</u> size and [in] <u>has</u> low power consumption.